

STUDENT HANDOUT

Physical and Chemical Changes



Physical Change
Water to Ice



Chemical Change
Water to Hydrogen Peroxide

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Physical and Chemical Change Lab – Part 1²

Pre-Lab Discussion:

Chemistry is the study of matter and the changes it undergoes. These changes can be broken down into two classes – physical changes and chemical changes. In a physical change, one or more physical properties of a substance are altered. Examples of such physical properties include size, shape, color and physical phase. Grinding, melting, dissolving, and evaporating are all physical changes. No new substances or substances are formed as a result of a physical change.

A chemical change results in the formation of one or more “new” substances. These new substances differ in chemical properties and composition from the original substance. The rusting of iron and the burning of paper are two examples of chemical change.

This experiment will help you to understand the difference between physical and chemical change and to recognize each type of change when it occurs.

Purpose: Recognize and distinguish between chemical and physical changes.

Equipment:

Lab balance
Lab burner
5 test tubes

Test tube rack
Test tube holder
Watch glass
Glass square

Mortar and pestle
Magnet
Safety goggles
Lab apron

Materials:

Copper sulfate pentahydrate -
($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$)
Sodium chloride (NaCl)
Hydrochloric acid (6M HCl)

Silver nitrate (0.1M AgNO_3)
Sulfur (S), powdered
Iron fillings (Fe)
Wood splint

Magnesium Ribbon (Mg)
Paper (5cm x 10cm)
Birthday candle
Weighing paper
100mL beaker

Safety:

When heating a substance in a test tube, be sure that it is pointed away from others. Handle acids with extra caution. Wear goggles at all times and report any spills to your teacher. Be sure to give glass enough time to cool before you touch it since glass retains heat.

Procedure (and Observations/Data):

Note and record all observations in your data table. (Be sure to record observations, before, during and immediately after each step in the procedure.)

1. Light candle and secure it to the glass square. Allow it to burn until it extinguishes itself. Proceed with the rest of the experiment while the candle is burning.

Reaction	Observations	What changed/made	P or C
Melting candle wax			
Burning candle (wick)			

2. Tear a piece of paper (about 5cm x 10cm) into small pieces. Set a watch glass on the lab table and place the pieces of paper on the glass. Light the wood splint with the lab burner and use it to ignite the paper.

Reaction	Observations	What changed/made	P or C
Tearing paper			
Burning paper			

3. Add a small amount of NaCl (sodium chloride) to a small quantity of water (about 5mL) in a test tube. Shake the contents of the test tube. Next, use a dropper to add 10 drops of 0.1M AgNO₃ (silver nitrate) to the NaCl-water mixture.

Reaction	Observations	What changed/made	P or C
Dissolving NaCl			
Mixing NaCl and AgNO ₃			

4. Obtain one piece of magnesium ribbon. Place the piece of Mg into a test tube and add a few drops of 6M HCl (hydrochloric acid).

CAUTION: Use extreme care when handling this acid. It will cause severe burns if allowed to come in contact with the skin.

Touch the bottom of the test tube with your fingertip.

Reaction	Observations	What changed/made	P or C
Tearing/Cutting Mg Ribbon			
Adding HCl and Mg			

- Use a mortar and pestle to grind several crystals of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ into a uniform powder. Place one wood splint of the powder into a test tube. Heat gently over a burner flame for 3 minutes. Allow the sample to cool, then add a few drops of water.

Reaction	Observations	What changed/made	P or C
Grinding $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$			
Heating $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$			

- Using the lab balance and a piece of weighing paper for each sample, measure out 0.5g of iron filings and 0.5g of sulfur. Test each sample with a magnet. Mix the two samples thoroughly in a test tube. Run the magnet along the bottom and sides of the test tube.
- Fill the 100mL beaker with water. Heat the iron-sulfur mixture in a burner flame for several minutes until the mixture is “glowing” hot. Immediately put the hot test tube into the water in the beaker. (The test tube should crack.) Carefully remove the substance from the test tube using a wood splint. Probe the substance with the wood splint and test it with the magnet.

Reaction	Observations	What changed/made	P or C
Mixing Fe and S			
Heating mixture of Fe and S			

Questions:

- Name two possible things you might see that would give you an indication that a chemical change has taken place.
- The following changes do not always indicate chemical change. Give examples of instance where these changes might be the result of a physical change.
 - Change of color
 - Apparent loss of mass
 - Apparent disappearance of a substance
- How can substances in a mixture be separated? How can substances in a compound be separated? Use examples from this experiment in your explanations.